

What is claimed is:

1. A radioactive gas measurement apparatus, comprising:  
a radiation detection system having a main detector and a sub-detector that are arranged at positions diametrically opposed to each other with respect to a sampling chamber, into or out of which a radioactive gas flows, and a shield for shielding a background radiation surrounding the detectors;  
and

an anticoincidence counter circuit in a measuring circuit, in which a particular radiation emitted from the radioactive gas is measured with an anticoincidence count processing using signals of both the detectors,

wherein the main detector is a plate-shaped semiconductor detector having a thickness less than a diameter of a surface thereof orthogonal to the thickness direction.

2. A radioactive gas measurement apparatus, comprising:  
a main detector and a first sub-detector having the shape of a well and surrounding the main detector that are arranged at one of two positions diametrically opposed to each other with respect to a sampling chamber, into or out of which a radioactive gas flows;

a second sub-detector arranged at the other of the two positions; and

an anticoincidence counter circuit as a measuring circuit, in which a particular radiation emitted from the radioactive

gas is measured with an anticoincidence count processing using signals of the main detector and two sub-detectors,

wherein the main detector is a detector made from a plate-shaped semiconductor having a thickness less than a diameter of a surface thereof orthogonal to the thickness direction.

3. The radioactive gas measurement apparatus according to Claim 1 or 2, wherein the thickness of said plate-shaped semiconductor detector is between 2 mm and 7 mm.

4. The radioactive gas measurement apparatus according to Claim 1 or 2, wherein said shield for shielding the background radiation is made of a material that does not emit a characteristic X ray within a range of energy from 70 to 90 keV inclusive.

5. A failed fuel detection system, wherein radiation intensity emitted from Xe-133 contained in an off-gas in a reactor condensate system is measured by the radioactive gas measurement apparatus according to one of Claims 1 to 4, the measurement values are collected on the time series, and the resulting time-series data is analyzed to detect a fuel failure in a reactor.